

NJDOT Bureau of Research  
QUARTERLY PROGRESS REPORT

Project Title:	Development of an Enhanced Emergency Location Transmitter (E <sup>2</sup> LT) for General Aviation	
RFP NUMBER:	Research Challenge Grant	NJDOT RESEARCH PROJECT MANAGER: Ed Kondrath
TASK ORDER NUMBER:	99ROW1-2	PRINCIPAL INVESTIGATOR: H. Clay Gabler Rowan University
Project Starting Date:	1/1/2001	Period Starting Date: July 1, 2004
<b>Original Project Ending Date:</b>	6/30/2002	<b>Period Ending Date:</b> September 30, 2004
<b>Modified Completion Date:</b>	6/30/2005	

Task	% of Total	% of Task this Quarter	% of Task to Date	% of Total Complete
Literature Search	5		100	5
1. Development of Mobile Unit	15		100	15
2. Design of Crashworthy Enclosure	10		100	10
3. Development of Base Station	3		100	3
4. Performance Testing	15		83	12.5
5. Interim Report	5		100	5
6. Evaluate E <sup>2</sup> LT in Full Fuselage Crash Testing	4		100	4
7. Evaluate E <sup>2</sup> LT in Normal Landings	10	15	35	3.5
8. Refine Crash Detection Algorithm	10	5	15	1.5
9. Mobile Unit Enhancement	10	5	20	2.5
10. Base Station Enhancement	3			
11. Teardown of ELT	5		60	3
Final Report	5			
TOTAL	100%			65%

# **DEVELOPMENT OF AN ENHANCED EMERGENCY LOCATION TRANSMITTER (E<sup>2</sup>LT) FOR GENERAL AVIATION**

**NJDOT Research Task Order 2  
Quarterly Progress Report – September 2004**

**Clay Gabler  
Rowan University**

## **Project Objectives:**

The goal of this project is to develop an Enhanced Emergency Locator Transmitter for general aviation craft. The research program will construct a prototype E<sup>2</sup>LT system, evaluate the performance of the E<sup>2</sup>LT through field testing, and refine the E<sup>2</sup>LT design based upon these field tests.

## **Project Abstract:**

Rowan University is developing an Enhanced Emergency Locator Transmitter (E<sup>2</sup>LT) for general aviation craft. The E<sup>2</sup>LT will supplement existing Emergency Locator Transmitter systems which broadcast a simple radio beacon in the event of an aircraft crash. Unlike existing devices, however, the E<sup>2</sup>LT device will transmit the crash site location and crash severity directly to Emergency Response Teams. The specific objective of the proposed project is to design, develop, and test an advanced emergency location system that combines inexpensive crash sensors, Web-enabled wireless communications and Global Positioning Systems to transmit crash site location to an Emergency Base Station. The purpose of the system is not only to shorten the time it takes for authorities to respond to the crash site, but to improve the quality of the response.

# **DEVELOPMENT OF AN ENHANCED EMERGENCY LOCATION TRANSMITTER (E<sup>2</sup>LT) FOR GENERAL AVIATION**

## **NJDOT Research Task Order 2 Quarterly Progress Report – September 2004**

**Clay Gabler  
Rowan University**

### **1. Progress this quarter by task:**

Task 7: Design of On-board Data Acquisition System. Development of a data acquisition system (DAQ) to be carried on board the aircraft has been completed. The final system is a customized DAQ system hosted on a PDA running the LabView data acquisition software. Per the constraints of the Mercer County Flight School at which the system will be used, the system has very low weight, and sufficient self-contained power to run for eight hours between battery charges.

The system has been successfully checked out in a series of impact validation tests in the Rowan Drop Tower. In these tests, a high precision laboratory grade accelerometer was mounted beside the DAQ system ADXL-250 accelerometers. Measurements from the ADXL-250 accelerometers were in excellent agreement with the higher precision laboratory grade accelerometer.

- Task 8: Refine Crash Detection Algorithm. With assistance from NJDOT Aeronautics, the research team has successfully flight tested the onboard DAQ system in a series of takeoffs and landings. In these tests, a member of the research team flew with an NJDOT pilot and manually recorded the deceleration experienced by a general aviation craft during landing. Both soft and harder landings were recorded as part of these tests. The results of these tests will be used both to refine the crash detection algorithm, and to set the trigger level for the automated recording of landings during Mercer County Flight School student training flights.
- Task 9 – Mobile Unit Enhancement. A promising low-cost new microcontroller, the Silicon Labs 8051, is being investigated for use with the Mobile Unit. If compatible with other parts of our Mobile Unit, the SL-8051 should eliminate the need for the external non-volatile memory required by the current system. The result will be a lower cost system of significantly reduced complexity.

## **2. Proposed activities for next quarter by task**

- Record landing data from Mercer County Flight School.
- Teardown a 406 MHz ELT to inspect conventional ELT crash sensors.
- Continue development of the enhanced Mobile Unit.

## **3. List of deliverables provided in this quarter by task**

No deliverables scheduled for this quarter

## **4. Progress on Implementation and Training Activities:**

No implementation or training activities scheduled for this quarter

## **5. Problems / Proposed Solutions**

- none

## **6. Budget Summary**

Total Project Budget	\$100,508
<b>Modified Contract Amount:</b>	<b>\$194,807</b>
Total Project Expenditure to date	\$133,642
% of Total Project Budget Expended	68.6%